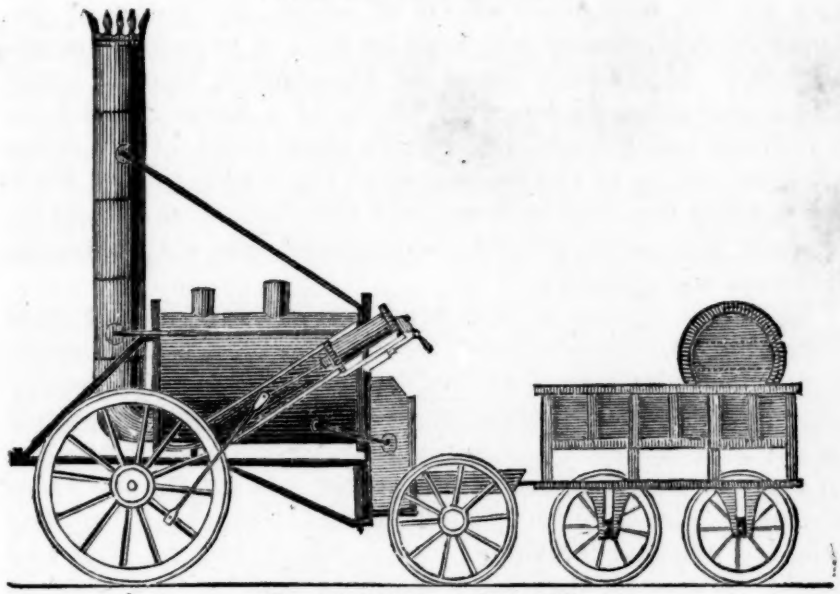
The Mechanic.

NOVEMBER, 1834.

[For the Mechanic.]

RAILROADS.



[Lomotive Engine, 'Rocket.']

After the general, though concise view we have taken of the steam-engine and its applications, we may with propriety give some historical information relative to those great auxiliaries to steam-travelling—railways. Their introduction forms an interesting epoch in the history of mechanical ingenuity, and the effect they produce upon the commercial state of the country, by the rapid transportation of goods, affording markets which otherwise could not be taken advantage of, and the tendency which they in consequence have, to lower the price of the necessaries of life, are not among the least important of its advantages.

The superiority of railroads over common roads consists in their great diminution of friction, the most moderate calculators estimating the resistance on a level turnpike road to be more than seven times as great as on a level railroad. It is evident that a smooth wheel will roll along a smooth plane of iron much easier than along one covered with loose and rough stones; for in the latter case, it would have to be lifted over, to push them to one side, or to crush them, either of which would produce a waste of power. Although railroads are self-evidently superior to any other method of inland communication, yet, until a very few years, they were considered useful merely where local circumstances prevented the construction of canals; (a method of transportation extensively adopted in England, and for the beneficial effects of which, the name of the Duke of Bridgewater will long be held in grateful remembrance.) It has been found by experiment, that at three and a half miles an hour, the power of a horse exerted on a railroad and a canal are exactly equal; but at six miles an hour, owing to the resistance of the water, he can draw three times the load on a railroad than he can in a boat on a canal, and as the velocity is increased, the disproportion becomes still greater.

Railroads appear to have been first adopted in the coal district of Northumberland, where the expense of conveying so heavy an article as coal by ordinary methods, showed the necessity of inventing some plan by which the labor might be lessened. Up to the year 1600, it was conveyed in carts on common roads, and in baskets on the backs of horses. The precise period when railroads were first adopted is not ascertained, but it was between 1602 and 1649. Although they were made of timber, and rude in their construction, yet they diminished the resistance and economized the power. These wooden rails consisted of parallel blocks of oak, placed across the road at intervals of two or three feet, which were fastened firmly into the ground; long pieces of thick plank six or seven inches in breadth, were laid upon these, and securely fastened by pins, forming two continuous parallel lines or rails for the wheels of the wagon, from the mine to the canal. The perishable nature of these roads rendered some improvement necessary; the timber was soon worn away by the friction of the wheels, the holes in the blocks or sleepers became too large for the pins after they had been once or

twice displaced in order to renew the rails, while the constant treading of the horses wearing away the blocks in the middle, rendered repairs often necessary. To remedy this evil the double railway was made; it consisted merely in laying other pieces of plank on the first, to which they were fastened by pins. These upper pieces, could, therefore, be renewed when worn out, without injury to the other parts, and as the rails were raised from the ground, the sleepers could be covered and secured from the action of the horses' feet. Notwithstanding the rudeness of these roads, they were long used at the collieries of Northumberland and Durham, where the advantages were apparent; the regular load of a horse with a cart on a common road being 17 cwt., while on these railroads it was 42 cwt. Where there were acclivities or abrupt curves, pieces of wrought iron were nailed, to diminish the resistance by making the rails more smooth.

It is now fifty or sixty years, since iron has been gradually substituted for wood on railroads; the date of its first substitution is variously stated in different accounts, and as several places claim the invention about the same time, it was not, probably, the result of any one discovery. From 1768 to 1776, is the period when the *plate-rail* or *tramroad* was first used. It consists of cast iron rails about four feet long, having a flange or upright ledge three inches high, to keep the wheel upon the horizontal part, which is about four inches wide and an inch thick, another flange projecting from the under side, to strengthen the rail; these rails were fixed together and fastened securely to stone supports. At first they were made to rest upon the transverse wooden blocks already described, or upon short square wooden sleepers, but stone is now generally adopted. Rails of malleable iron appear to have been used at Lord Carlisle's work, in Cumberland, about 1808, but though more economical, and less liable to accident, they have not until very lately been used. In fact, it was not until Mr. Birkinshaw obtained his patent for improved wrought iron rails, in October, 1820, that rails of this material came into competition with those of cast iron. The improvements of Mr. Birkinshaw were valuable, and those adopted at the present time are of the form specified in his patent. They consist in making the rails in the form of prisms, though their sides need not of necessity be flat; it is of the kind called the *edge-rail,* which is raised upon

sleepers, to allow the flange to be upon the tire of the wheel, instead of the rail, as in the tram-road. The upper surface on which the wheel of the carriage is to run, is about two inches broad, and slightly convex, in order to reduce the friction. The wedge form is used because the strength of the rail is always in proportion to the square of its breadth and depth.

The Stockton and Darlington Railway was the first laid down by Act of Parliament, for the conveyance of merchandize and passengers. This road was opened in 1825; it is about twenty-five miles in length, and consists of a single track, having turn-outs at every quarter of a mile, to allow carriages to pass each other.

In 1825, a bill was brought into Parliament to incorporate 'The Liverpool and Manchester Railroad Company;' it was not, however, until the succeeding session that the company succeeded in their application; £400,000 was to be raised by shares of £100 each, but was subsequently found inadequate to the purpose. The peculiar connection between Liverpool and Manchester, rendered a rapid and cheap communication between them a subject of national importance. Liverpool* is the port whence Manchester receives all her raw material, and to which she returns a portion of her manufactured goods, for shipment to all parts of the world. The economy of time in transport, is of the greatest importance in all large commercial operations; and certainty of delivery is equally important in the saving of capital. The whole distance by water, between the two places, is fifty miles, and the average time of passage about thirty-six hours, varying according to the state of the wind and tide; but by the railroad, the transit is effected in about two hours.

The difficulties of the undertaking were so numerous, that a majority in the House of Commons considered it entirely impracticable; and one member asserted that half the proposed capital would be required to cross Chat Moss, a bog only four miles in extent, of so soft and spongy a nature that cattle cannot walk on it. But the same spirit which prompted the Duke of Bridgewater to persevere with his canals, encouraged the Liverpool and Manchester

* In 1784, eight bags of cotton were seized by the custom house officers, out of an American vessel arriving at Liverpool, under the conviction that they could not be the growth of America. In 1824, there were imported into Liverpool from America, 409,670 bags of cotton.

Railroad Company; and although more than double was expended than was at first anticipated, yet the advantages have fully realized their expectations.

Of the skill and enterprise which was required, some idea may be formed from a summary of what was accomplished in the space of thirty-one miles. Two tunnels were excavated under the town of Liverpool to prevent crossing the streets; one 2,250 yards, the other 290 yards in length; six considerable eminences cut through, great part of which were hewn out of the solid rock; upwards of three millions of cubic yards of stone, clay, and soil have been dug out of the different excavations. From these materials, artificial mounds of great height and extent have been raised through the valleys. Along the line, there are sixty-three bridges; under thirty of these, the railway passes, on twenty-eight it passes over the common road, and on five, is conducted over the river Irwell and the canals. Twenty-two of the bridges are composed of brick, seventeen of wood and brick, eleven of brick and stone, eleven of wood, and two of stone and wood. The weight of the rails laid down is 3,847 tons, and of the cast iron pedestals on which they are fastened, 1,428 tons. The total sum expended in effecting this magnificent project, including warehouses, machinery, and carriages, is estimated at £820,000.* It was opened on the 15th of September, 1830, and from that time to the end of the year, seventy thousand persons were conveyed with but one accident to an individual.

[Abridged from the Journal of Science.]

MANUFACTURE OF EARTHEN-WARE AND PORCELAIN.

The art of fabricating vessels and other articles from clay is of great antiquity. The most ancient specimens of this art are the bricks found in the ruins of Babylon. These bricks are thirteen inches square and three inches thick, with inscriptions upon them in characters wholly unknown, and from their form, called arrow-headed letters. That city, built by Nimrod, 2,200 years before the christian

* $3,620,800.

era, is now a mass of misshapen ruins. Among the heaps, one large one is supposed to be the remains of the tower of Babel. It is seven hundred and sixty-two yards in circumference, and one hundred and ninety-eight feet high. The interior is filled up with unburnt bricks, set in clay.

Earthen vessels were known among the early nations of Asia, and the *potter's wheel* is mentioned by Homer, and the older writers of the Bible. Images of earthen of a deep blue color have been found with Egyptian mummies, and what is remarkable, the same coloring material, (cobalt,) is found to have been used upon them, which is employed for similar purposes at the present day. The Phœnicians, who were so early conspicuous in commerce, were also in possession of this art, from whom it was introduced into Europe.

The aboriginal Mexicans of this continent also understood the art, and vessels of earthen-ware have been found in the tumuli in our western country.

The most famous of all manufactures of this kind, is the porcelain of China, which has been made in great perfection for a vast length of time. The first Chinese porcelain which was brought to London, came about 1593, in a Portuguese ship. The introduction of this beautiful article into Europe awakened a desire to imitate it; and the chemists and mineralogists of Germany engaged eagerly in the design of discovering the art, which was kept a profound secret by the Chinese. A method of imitating it was at last discovered by a mere accident. A German alchemist, in his researches after the philosopher's stone, found that one of his crucibles, which had been subjected to an intense heat, had become a perfect porcelain. This discovery laid the foundation of the celebrated manufactory at Dresden, in which wares are made which rival those of China. The greatest secrecy is maintained respecting these works. They are established within the walls of the fortress of Meissen, on the Elbe, three miles from Dresden. Seven hundred workmen are employed, who are not permitted to go beyond the walls of the fortress. Neither can any visitors be admitted, without an especial order from the Governor of Dresden.

There are two other manufactories of porcelain in Europe, one belonging to the king of Prussia, at Berlin, and one belonging to the king of France, at Sevres. Porcelain is also made in England of fine quality.

The most extensive manufactory of earthen-ware in England is in Staffordshire, occupying a district ten miles in extent, where it is supposed that this ware has been made ever since the time of the Romans.

The materials of all pottery are principally *alumine*, or pure clay, and *silex*, or flint. Pure alumine is white, opaque, and tenacious, with an oily feeling, and forming a ductile paste when mixed with water; but when exposed to the heat of a furnace it contracts and falls to pieces. This is remedied by the admixture of silex, in composition with which it forms a hard and durable material by undergoing a process of baking. The proportion of silex to alumine in Chinese porcelain is 74 to 16. According to Vauquelin, European porcelain of good quality contains at least two thirds silex. The silex for use in potteries is obtained by quenching hot flints in water, which breaks them, and then grinding them in a mill.

To give porcelain its glassy, semi-transparent appearance, an alkali is added. This is a natural ingredient in the material employed by the Chinese, and hence one cause of the difference of their wares from all European porcelain, in which it is necessary to add the alkali separately; no clays being found in Europe identical with those of China. The two materials of which the Chinese ware is made are called *kaolin* and *petuntse*. In Europe, calcined flint supplies the place of the latter, and decomposed feldspar is substituted for kaolin.

Both the clay and the powdered flint, reduced to the fineness of flour, are prepared by being mixed in vats with water, to the consistence of cream, which operation is performed by moving long wooden instruments backward and forward through the mass of clay and water. When the coarse portions have settled, the finest part of the cream of both the clay and the flint are drawn off, and mixed together by measure. This liquid is then passed through sieves of the finest silk lawn, in order to detect any particles which have not been completely reduced. The material thus prepared is called *slip*. It is next poured into a cistern over a furnace, where the superfluous water is evaporated, and the matter is reduced to a proper consistence. It is then beaten, and undergoes several processes for the purpose of driving out any air that may be contained in the mass, and reducing the whole to a perfectly solid consistence.

The prepared paste is kept a long time before it is used, in order that it may, as it were, settle together into a more firm and solid mass. In China, it is usual to keep the prepared clay fifteen or twenty years; and 'in some districts, it is the custom for the father to prepare as much clay as will be sufficient for the son throughout the whole period of his life.'*

The process of making vessels of the prepared clay is of three kinds, technically called, *throwing*, *pressing* and *casting*. The first is performed on a wheel, on which, revolving horizontally, a lump of clay is fashioned into a vessel with great celerity, principally by the aid of the hands. Pressing is the forming of various articles by squeezing the clay between two pieces of a mould of the proper form. In this way handles and other irregular shaped ornaments of vessels are formed, and then joined by being dipped in the slip, or liquid clay, which acts as a cement, to hold the pieces together. The moulds are made of plaster of paris. In casting, the soft clay is poured into moulds, where the clay stiffens quickly around the sides of the mould, and when a sufficient thickness is dried on, the remaining liquid is poured out.

When the vessels are formed, and sufficiently dried to admit of being handled, they are taken to the kiln in boxes of clay, each article being kept perfectly separate in the boxes. These are piled up in the kiln, and when full, the entrance by which they were carried in is closed up. The heat of the fire is gradually increased, and kept up for two days and nights. When the burning is completed, the chimneys and apertures are closed up, and the kiln is left to cool as gradually as possible, in order that the change of temperature may not affect the ware.

The baked ware is now called biscuit, and is ready for coloring and glazing. The colors are applied as follows. The engraving to be copied is made on copper-plate. From this an impression is taken on a soft bibulous paper, with the proper color, and this paper is applied to the ware, on which it leaves an exact copy of the engraving.

The finishing stroke now remains to be given by the glazing. Numerous glazes are employed, but a great objection to most of them is, that they contain lead, which is

* This reminds us of the old story which we have heard, of the china-ware being buried in the ground by one generation, and taken out by the next.

not only highly injurious to the workmen, but deleterious to those who use the vessels; for it is well known that certain salts and acids used in cookery corrode the glazing, and instances are sometimes heard of poisonous pickles; which were kept in earthen pots. The glaze is applied in a liquid state to the biscuit, which is dipped into it, and is then submitted a second time to a furnace, to *vitrify* the glaze, or to convert it into a kind of glass on the exterior of the ware. Without this, the biscuit would neither be so durable, nor absolutely impervious to water. Porcelain is gilded by applying gold in a state of solution, and the fire reduces it to a metallic state.

The real porcelain of China is different in composition from any of the European imitations, nor has the cause of its superiority been ever yet understood. Its durability in extreme heat is so much superior, that, while the English became perfectly vitrified in the furnace, and that of Dresden began to bend, the Chinese material did not even soften or become altered, at the highest possible degree of heat.

At King-le-ching, a district in the province of King-si there are five-hundred manufactories, which give employment to more than a million of workmen.

The porcelain tower of Nankin is an astonishing monument of the durability of this unparalled manufacture. It is of an octagonal shape, consisting of nine stories, three hundred feet high, and covered over its whole surface with the choicest porcelain. This beautiful edifice has withstood the elements and the changes of seasons for four hundred years, without alteration or injury.

[For the Mechanic.]

AN ODD CHAPTER.

What a master-key of the secrets of knowledge is observation. Learned men have become eminent, and ignorant men learned, merely by a free exercise of its powers. Nothwithstanding this, how very apt we are to be content with simply glancing at the most important subjects, instead of searching for the causes, from which observation may deduce useful and lasting truths.

Sir Humphrey Davy, one of the most successful explorers of the secrets of natural science, was eminent for this constant endeavor to trace from the effect to the cause; a single instance will be sufficient. He had heard the common observation, that red clouds tinged with purple at sunset, was the sure prognostic of a pleasant morning, which is correct as a general rule. For this phenomenon he wished to assign a philosophical theory; observation gave the following:—If watery clouds are floating in that part of the horizon, more yellow rays would be refracted, whereas if the atmosphere were dry, the red and purple rays would be more abundant. A course like this, it is true, will require both mind and patience, but the result will be proportionably pleasing; many popular errors would be corrected, and operations explained, which would otherwise remain to embarrass and perplex.

When the eye is inflamed with dust, and an eye-stone is recommended, the relief is generally attributed to the stone being alive, traversing in every direction over the eye, and gathering up any foreign particles it may find in its rambles; and appearing to crawl on the bottom of a plate when vinegar is poured upon it, is considered sufficient to give it a place among the animated creation. All of this, however, is decidedly erroneous. Its effect upon the eye, is no doubt, often beneficial, not on account of its *gathering up* the dust, but because it raises the eye-lid from the ball, and thus allows the tears to flow to every part and cleanse the eye; the movement of the stone is produced by that nervous twitching, which would naturally ensue from the introduction of anything so large into this delicate and susceptible organ. Its motion in vinegar is very far from being any proof of life, as a piece of oyster-shell or marble will move quite as lively, if subjected to the same treatment; the real cause is a chemical action between the acid vinegar and the carbonate of lime, of which they are mostly composed; by which action a gas is formed, and adheres in small bubbles to the eye-stone, and those upon the under side support it so freely, that the enlarging of one of the bubbles will easily cause it to slide from it, and give the idea that it moves of its own accord. If some sulphuric acid, considerably reduced with water, be poured upon an eye-stone, placed upon a piece of window-glass, the operation of the formation of the bubbles, and the cause of the motion, may be plainly seen.

If the color is destroyed in a dress, by vinegar, lemon juice, or other acid, it may often be restored, by immediately applying spirits of hartshorn. It may here be inquired, of what particular use is it for a person to know the cause, if he knows the material and can produce the effect? we answer, that by knowing the material, he may restore the color of a dress, but here is the boundary of his knowledge; whereas by studying into the cause, namely, that spirits of hartshorn is an alkali, and when mixed or brought in contact with an acid it neutralizes or destroys its power, it will enable him to apply it to a variety of purposes. If, for instance, some strong lye or potash should by accident get upon the skin, to attempt to wash it off with water would be a slow and imperfect process, but if a little vinegar or acid were used, it would destroy the caustic effect almost immediately; or to reverse the case, suppose some aquafortis or other corrosive acid to be spilled upon the hand, a little hartshorn or pearlash would prevent its penetrating to the flesh, and oftentimes producing a painful wound.

We might thus proceed, almost *ad infinitum*, in enumerating the advantages to be derived from study and observation, did we believe it necessary, but the fact that it is not, is too self-evident; and we will, therefore, silence the efforts of our organ of causality, that our readers may have an opportunity to exercise their own. JUNIUS.

Boston, November 3d, 1834.

[For the Mechanic.]

THE FINE ARTS.

PERHAPS the most unequivocal indication of the degree of refinement and civilization to which a people have arrived, is the perfection to which they have carried the fine arts. These require a high state of mental culture, to put forth their greatest degrees of excellence, and to be displayed with all the power of which a masterly genius is capable. Where do we find these in a far advanced state? —where, if not where civilization, in her mildest forms, reigns; where the sciences are cultivated, and their culti-

vators respected; where all that is noble in the nature of man is encouraged, and where all that is base and vile is regarded, as it ever should, and ever will be, by an enlightened community, as a blot and a disgrace to man. In a word, are not the liberal, the enlightened, the refined, the christian countries of modern days, those where the arts best flourish? Some arts, it is true, are cultivated, and highly cultivated too, in less liberal and refined regions—but these are exceptions—either of the genius of a people rising above the shackles imposed upon it, and struggling to be great under oppression, or the genius of a few, courted by the great, and by royal munificence, allowed that wide field for exercise which genius must have, but which royalty only gives for selfish ends. There, it is not the love of art in a people, fostering it in their bosom, and cherishing it, as an ornament in the shield of their freedom.

Look at that land, to which we love to give the honored title of classic land. That land, where the young genius of liberty first alighted, as he gazed over the beautiful regions of Southern Europe. Where ever wrought the chisel finer—more angelic forms—where ever breathed more harmoniously the sacred lyre of poesy—where ever was the painter's pencil wielded with more sublime effect, than beneath the glowing skies of sunny Greece? And why? The love of them was there cherished by all that could combine to ensure success. Was genius needed? It glowed in Grecian breasts—their delightful air, their glorious scenery, inspired it. Their liberal governments and patriotic rulers, gave it freedom of action, and bade it prosper under kind and generous laws. Was motive wanted? Genius was called upon to build the temples of the gods, and to adorn them with the costliest statues. The tombs of the great and glorious were adorned with splendid sculpturings, and their living statues stood even in the streets, to waken in the hearts of all, that spirit which glowed in their breasts. Was reward wanted? The applause of their country was the meed of talent. Genius not only became wealthy, which was much to desire, but immortal, which was more than it asked. Its fame is not dead yet, its light is not yet faded, though near twenty conturies have settled over their ashes. Greece yet lives—in the heart of the scholar, and in that stricken race who still claim their descent from that glorious nation, and who are still inspired by the music of the same language. Half

the world is yet enchanted with the beautiful and original models of Grecian art, and content to trace her footsteps in the most sublime of arts. Her fame may never die.

From this delightful spectacle, we know not how to return to the prospect of the fine arts in our days. There is a coldness in the manners of modern civilization, that causes the fire of the young genius of the ancient world to dazzle and blind the eyes. But though the flame—the devotion of soul to the arts of producing beauty has cooled, —though feeling is not in our days, as in the days of Greece's splendor, the predominant temperament of the manifested mind, still it is not extinguished. The coldness and correctness of practical science, has laid, it is true, the measure and the rule, even to the bold plans of genius, and the flights of winged ideality; but there is a spirit, which heeds not, through all changes, and through all revolutions of men and of manners, the limits which refinement and criticism would set to the wings of genius.

The music of Italy and Germany, the sculptures of Canova and Chantry, the paintings of West, &c., are some of the evidences to which we look, of the existence of genius in these days. Do we not see it glowing around us? Even in this young world, are not masters of art rising up, whose works shall hand down their names to posterity, encircled with laurel wreaths? In architecture, by no means ignoble, even among the fine arts, a taste is arising amongst us, for pure, classic models. We are teaching ourselves, as a people, that the beauty of our cities, as displayed in their public buildings and architectural monuments, being, as it will and must be, an index to the refinement and perfection of our national taste, must be increased and made predominant. We have, as a nation, passed the first stage of our existence, our infancy, in which our attention was to be exclusively devoted to the supplying of mere necessary wants, leaving no time nor room for the embellishment of our country or of our minds; a new era is coming, when we are to rank among the nations as a refined, a cultivated people.

It will be easily seen why this subject is brought into view in such a work as this. Directly or indirectly, the cultivation and perfection of the fine arts, *must* depend on that of the mechanic arts. Each engine at work in the progress of refinement and civilization, in cultivating science, and extending the triumphs of art, instead of stand-

ing alone, works only to its full extent of power, when aided by the united efforts of all the rest. If, then, we would cherish and encourage the fine arts, we must also cherish the mechanic arts, and endeavor to raise the mechanic himself to a consideration of the need in which we stand of him, and the important influence which he may, and must exert, in the successful prosecution and advancement towards perfection of his branch of art.

The art of engraving deserves our and their particular interest. Standing as it does, in a middle place between the originating and the mere mechanical arts, its bearing on either side is great and important. As a means of mulitplying to an astonishing extent, the original productions of genius, in the art of representation, giving to these that omnipresence possessed by the works of the poet and the musician, it deserves our highest regard. As the perfection of mechanical skill and ingenuity, it is no less worthy of being cherished and encouraged by an enlightened community, who know how to appreciate the value of native talent and original genius.

These arts, perhaps, owe more to their improvers and perfectors than to their inventors. The skill required to perfect, and to give to them that power, which in skilful hands, directed by superior talent, they are able to exert, is greater than the power of mind required to originate the method. Thus, the fine arts, unlike the others, as they go on in improvement, continue to confer new and greater honors on their successful improvers, while the fame of other inventions rests alone upon the founder, there being no farther need of talent in the prosecution of the art or business, where the principle has been once discovered and put into practice.

No less intimate is the connection between the fine and the purely mechanical arts, than between the sciences and the arts; equally necessary to the success of the fine arts is the perfection of scientific knowledge, and the progress of scientific discovery—and this, in a great measure, by its importance in the mechanical arts, which stand in the greatest need of scientific investigation, in order that their processes and methods of operation shall be brought to a high degree of excellence. And here, in leading the mechanic to a view of the importance of his profession, as it regards the progress of the arts and civilization, we are directly led to consider his dependance upon science, to

enable him to further those objects in the most effectual manner. In some of the arts, more or less of scientific attainment is found absolutely necessary for their successful prosecution, and in others, its influence can but be highly beneficial. Yet, we regret to say it, a superficial acquaintance with scientific principles is all that is generally considered of importance. The basis, as it were, of a science, the reasonings and processes by which its truths become known, are thrown quite in the back ground, although a knowledge of these would greatly enhance the value of their acquisitions in science.

Those of the fine arts which have a more especial relation to the mechanic, are architecture, sculpture, painting and engraving, and the various branches and sub-divisions of art, included under these general heads. Whether the last mentioned is, by long usage, and the established rule of custom in language, entitled to this rank, may, perhaps, be questioned, but its high degree of importance, as an art, and the talent which it occupies, will not be made matter of dispute. It has, perhaps, as great an influence on the community, especially the reading and liberal community, —nay, perhaps, greater, than that of any of the fine arts, music excepted. The arts of engraving, (including for the sake of convenience, the more modern art of lithography, though the classification be not accurate,) by multiplying with exquisite beauty, drawings and sketches of the highest order of talent, and bringing them within the reach of so many, at such trifling expense, might naturally be supposed to have a vast influence on public taste. Too often, has that influence been exerted in leading astray the mind, by its unchaste, though beautiful imagery. Too often has the most splendid genius been prostituted to hideous vice, and the thousands its mighty power, strong towards evil, has seduced, may not be enumerated.

But the rightly directed influence of the fine arts is wholesome. Inciting in the mind a love for the beautiful and the noble, they cherish the cultivation of the sentiments which these awaken, and place them in rule over the meaner and servile passions. Thus it was, that, as we have seen, the spirit which animated Greece in her best days, died not in her succeeding days of bondage, and even illumined the minds of her proud conquerors with feelings that never before glowed in their breasts, and the Roman, in his strength, bent the knee to Grecian genius.

Such, it is to be hoped, will be their influence in our land. And what, aided by the principles of a holy and a life-giving religion, which Greece knew not—what is to be expected from it? If a day is coming, in which, on everything shall be inscribed, at least in the spirit of the user, 'Holiness to the Lord,' shall not these noblest arts be made to yield the greatest tribute of their power and their influence to the most sacred of causes.

TUNNEL UNDER THE OHIO.

A WRITER in the Cincinnati Journal recommends the construction of a railroad under the Ohio river, opposite that city. The following is an outline of the plan:

The railway is to consist of two semi-ellipses, one above and the other underneath. The height of the upper arch is to be 10 feet, and the lower 3 feet, and 24 feet in width inside, making the ellipse 13 feet high and 24 feet wide in the clear. The arch is to be composed of cut stone, masonry two feet thick. This arch is to be buried in the ground just sufficient to protect it from the action of the river. A floor composed of timbers laid lengthwise, on the bottom of the arch, and covered with planks, forms the carriage-ways and sidewalks. The carriage-ways are to be each 8 feet wide, and the side-walks each 4 feet wide. The side-walks are a little raised above the carriage-ways. The stones composing the arch are to be cut so as to form segments of the ellipses, and laid in hydraulic cement, and made as near water-tight as practicable. Notwithstanding all the care that may be taken in the construction, yet with a pressure, in time of high water, of 4375 pounds upon each square foot of the arch, the water will percolate through in such quantities as to require an engine to keep the road dry. It will, of course, be necessary to light the interior when opened for travel.

Between high and low water marks, there is a difference at this place of about 63 feet, and allowing the top of the arch to be 7 feet below low water in the bed of the river, and placing the bottom of the arch at each end, at high water mark, will make the total descent 83 feet. It is thought that one foot ascent in twelve feet horizontal dis-

tance is the greatest inclination the road will admit; consequently, the length of the inclined arch, from high water mark to the bed of the river, will be about 1000 feet; and allowing also that the bed of the river at low water is about 1000 feet wide, will make the total length of the road 3000 feet.

The only difficult point in executing the work will be in excavating the earth and rock below low water. It is quite practicable, however, in a dry season, at comparatively small expense, to enclose a space with a frame of timber and plank, made water-tight by placing bags of earth around the outside, and pump out the water with an engine placed upon a flat boat, until the excavation is completed, and the arch formed within the space enclosed. Then, by moving the same coffer-dam its length farther along, another space can be enclosed, and the work completed in the same manner, and repeated until the bed of the river is crossed. This part of the work will depend upon so many contingencies that no accurate estimate can be made of the expense attending it. The masonry of the arch and the flooring can be estimated with tolerable accuracy. The stone for the work can be obtained one hundred miles up the river, where extensive quarries are already opened. The cost of the masonry will be as follows:

Quarrying the stone per perch of 16 1-2 cubic feet,		$1 00
Delivering, " " "		2 50
Cutting the same with three faces,	"	2 25
Mortar of water, lime and sand,	"	50
Laying the stone, including centering,	"	75
Cost per perch,		$7 00
Every 10 feet in length of the arch will contain 78 perches of masonry, which, at $7 per perch, will be,		$546 00
Every 10 feet in length of the floor will contain 100 feet of timber, at 12 1-2 cents per foot, $12 50 —220 feet of plank, at 3 1-2 cents, $7 70		20 20
Total cost of 10 feet of the road-way		$566 20

This being multiplied by 300, for the length, will give $169,860 for the total cost of the arch and flooring. If to the above we add the probable cost of pumping the water, and excavating the earth and rock for the road-way, and of covering the arch over again 3 feet deep, it will make the total expense not less than $210,000. To which should be

added $20,000 for superintendence and expenses of the affairs of the company, &c. There can be no doubt that the stock in such an undertaking will yield a handsome profit.

It will be observed that a road-way, constructed upon the above plan, leaves the river entirely unobstructed; that the arch is completely out of the reach of injury from the river; that it is permanent, solid, and will last forever; and that it involves but a trifling expense to keep it in order for constant use.

[For the Mechanic.]

MEMOIR OF THE SURVEY OF GEORGE'S ISLAND, BOSTON HARBOR.

BY LIEUT. R. PARK, OF THE UNITED STATES ENGINEERS.

This survey was commenced September 12th, 1833, and completed December 7th, 1833. A base line was first measured, 1000 feet long on the west shore, avoiding the brow of the south hill, on a line which was almost level, by nature. Two measures were used, each 25 feet long, and the direction was preserved by a theodolite. Stakes were driven into the ground at each interval of 25 feet, and where it was possible, they were driven down till their tops were on the same level. This level was determined by a common spirit level. The back measure remaining unmoved, the other was then carefully abutted against it, nearly in the direction, to mark the length, approximately. The true direction was then accurately fixed, by holding the point of a knife so that it should be seen on the axis of the theodolite telescope. This being ascertained, and a cut made with the point of the knife in true prolongation of the line, the 25 feet measure was again applied, and a cut made carefully on the top of the stake, perpendicular to the direction of the base line. The *back measure* was then taken up and carried forward, and it was examined whether the back end of the measure, still lying, coincided with the cut previously made.

Thus, for each 25 feet it was necessary, 1, to get the approximate length and direction to drive the stake; 2, to drive the stake to the proper level, or else to level the

measure by keeping one end raised; 3, to find the approximate length, and mark the true direction by the theodolite; and 4, to fix the true point, by abutting the measures without moving the back one, and making a cross-cut with the knife. On repeating the measurement, the whole difference in 1000 feet, was about 0·03 of a foot. As the difference increased uniformly, the last measurement was taken as the standard. This difference might have been owing to the temperature, but we had no thermometer to determine it. Brass tacks were then driven, one into each stake, where the cuts crossed each other, and the cuts carefully repeated on the tacks. The principal difficulty experienced was to drive the stakes so that the point should fall on the head of them. An iron tooth or pin was generally driven down first, at least if the ground was hard; and it was necessary to watch the pin, and afterwards the stake while driving it, to see that they did not drive one side.

The base line being finished, two normals were measured in the same manner, perpendicular to the ends of the base line, and each 550 feet long. These ascended, one upon each hill. On the ascent, no attention was paid to levelling the stakes; they were merely driven firm, and if they drove aside, were rectified by driving wooden wedges beside them. One end of the measures was now rested upon the higher of two stakes, and the other end supported by a tripod, on which the measure could be raised or lowered till it was level. On the south normal, where the brow was very steep, it was necessary to measure only ten feet at a time, by a *ten-feet measure*, graduated by the same standard (or reduced to the same,) one end of which rested on the tripod. The lower end of the measure was adjusted by a plumb, on which account it was found that we could measure faster *down-hill* than *up*, because the back end of the measure was sooner adjusted. We had great difficulty in keeping the *plumb* still when the wind blew; this was partly overcome by procuring a *screen*, which was held on the windward side if possible; or if held on the leeward side, it still formed an eddy, which was far better than a free wind. As the limb of the theodolite was not accurately graduated or centered, it was necessary to take a mean of all four quadrants, in directing the normals, or laying out a right angle.

On uniting the ends of the normals, by a line parallel to the base line, to complete the rectangle, the angles were

found to agree exactly; but the length of this fourth side was found, by a double measurement, to be 0·19 of a foot more than that of the base line. Of this error, one half was allowed for the directions, and the other half for the measurement of length, and this latter was divided between the two ends, and intermediately proportioned.

All the sides of this rectangle were then prolonged, and the opposite sides connected by parallel lines, at intervals of 50 feet, thus dividing the whole island, out to the low water line, into squares of 50 feet each side, with stakes at all the angles. The lines parallel to the base were called *parallels*, and those perpendicular to the base, for distinction's sake, were called *normals*. In filling up these lines, the theodolite was first set at intervals of 50 feet along the base line, and directed to the corresponding stake on the opposite side of the rectangle; or if this could not be seen, it was carefully directed at right angles to the base, taking long ranges and the mean of the quadrants, when it stood near one end of the base, or bisecting the 180°, when it stood near the middle. Guide stakes (temporary) were then driven, at intervals of 200 or 300 feet on each normal, as far as the ground would permit us to see, thus forming as it were the *warp* of our net-work of stakes. The theodolite was then established at one end of the rectangle, in the same manner on the successive parallels, and then the stakes were driven along each parallel, 50 feet apart, by ranging with the plumb, along the normal guide stakes. In some cases, the guide stakes were driven first along the parallels, and the *woof*, so to speak, filled in by driving the stakes along the normals. In passing over the hills, or from the brow of the hill on the east and south to the *flat* below, the lines were prolonged, either by setting the theodolite on the other side of the rectangle, and striking a right angle, or by setting it on the end of the range already marked, and striking an angle of 180°. In this way, by prolonging the ranges, the survey was continued from a bluff 60 feet high, to the flat below.

The levelling was done by means of a telescopic level, (or *nivellite*,) and levelling rods 6 feet long, but capable of sliding out to the length of 11 feet. But in prosecuting the levelling, it was found economical to procure a rod 15 feet long, divided only into feet from 10 feet to one end, and also, to procure another rod 20 feet long, divided into feet and tenths, the feet numbered with as large figures as

possible, that they might be seen at a distance. The 15 *feet rod* was used for getting *tables*, when the difference of height was more than 10 feet; and the 20 *feet rod* was sufficiently accurate for getting the points of the ground.

The *horizontal plane of reference*, or zero of height, was assumed = the surface of the lowest *low water* which had occurred there, to our knowledge, during the season. Heights above this, were assumed positive; soundings below it negative. It was determined by stakes driven at the edge of the water, at different times of *low water*, (as well as *high*,) by the men. Proceeding from this *zero*, the height of the level (*nivellite*) was first ascertained at each station of that instrument; *tables* then were obtained, (that is, points whose exact height was found and recorded,) when possible, on a high and smooth place on a rock, painted black to mark it. By these tables the height of the nivellite could be found at the next station, and so onward. At each station, the height was then found of all remarkable points of the ground within easy sight; which, on the 20 *foot rod*, was 300 feet at farthest. But on the slopes, as the line of sight soon cut the ground on the upper side, or became too high on the lower, the field was more limited.

To designate the particular stakes, the *parallels* were lettered, A, B, C, &c. on the east side of the base line, and *a*, *b*, *c*, &c. on the west side. The *normals* were numbered, beginning at the probable limit of soundings, on the north, 1, 2, 3, &c. towards the south. Thus, c 20 designated the stake at the intersection of parallel c, and normal 20. c, 20 + 15′, indicated a point on the parallel c, and 15 feet, from the normal 20, towards normal 21. c + 10′, 20 indicated a point on the normal 20, and 10 feet from parallel c, towards D. c + 10′, 20 + 15′, was a point 10 feet from parallel c, and 15 feet from normal 20, going towards parallel D, and towards normal 21. Thus any point of the ground might be indicated, and the *Field Book* merely designated the points, placing under each point the height of the *nivellite*, and the distance of the designated point below the niveau, e. g.

(A + 10, 15)
20·15
13·06
7·09

The subtraction performed in the office, shows that the point A + 10, 15, being 13·06 feet lower than the nivellite,

was 7·09 higher than zero, or the lowest low water. On the map, therefore, it will be written 7·09, a point being made in ink, and its distance from the parallels or normals also written down. From these references, the curves of the ground will be determined for every foot. That is, suppose the water to have risen one foot above its lowest level; the *curve* 1 would then be the water line, &c.

The *nivellite*, being lightly mounted, was found to quiver in the wind. This difficulty was completely obviated by procuring a *shelter*, consisting of two vertical sides, united and presenting an acute angle to cut and break off the wind, as it stood on the windward side of the nivellite. Another difficulty was, to have the levelling rod held vertical. I could see that it was kept in the vertical plane of the axis of the nivellite, and I then had it waved towards and from me, noting the tangent to the *arc* described as the true level. In other words, the *lowest* reading on the levelling rod, where it was cut by the cross hairs, was the true reading.

There were some stakes and points on the eastern and southern bluff, which could not be levelled with the nivellite, though the points above and below them were accurately obtained. These were supplied by making sketches by the eye, as nearly as possible true, by measuring down with a line where the bluff was nearly vertical, or by holding up the 20 feet rod, and ranging by this and the horizon of the sea, to get the height of such points as were thus only accessible by climbing to them.

The upland being thus surveyed out to low water, always keeping a table of all the stakes levelled on each parallel, in order that none might be omitted, it only remained to *sound* out to 30 feet deep at low water. This was done by means of a sounding line and lead, which, by repeating the same sounding, was found to give all the results (but one) the same within 0·30, or less than 4″. It is believed that a sounding pole 30 feet long, used in the same current, would not have given results any more accurate. Indeed I tried the latter at Newport, and found the variation to be qnite as great. It would have been better to have had a reel one foot in diameter, on which to wind the line after each sounding; as it would then run out quicker, and without any danger of twisting or knotting.

The position of the points first sounded, and which were 50 feet apart in prolongation of the lines, was determined

by the intersection of the normals or parallels and *diagonals*, observed by means of four signal staves. The principal difficulty in sounding, was to bring the boat to the true position, by making due allowance for the effect of the tide, &c. It required much practice to be able to row the boat at once, to the point of intersection desired. The boat was rowed by two men, while one sat in the bow and recorded the soundings which I took, standing or kneeling in the stern; and the other two men attended the signal staves on shore. The height of the tide was marked at the beginning and end of each line of soundings; at first, by setting up the 20 *feet rod* in the water, and finding the reference of the foot of it by means of the nivellite. To this reference the height of water up the rod was added, to give the true reference of the surface of the water. The surface being thus obtained for the ends of the line, it was intercalated for the intermediate soundings, so that they might all be reduced to the general plane of reference. In sounding at intermediate points along the normals and parallels, it was necessary to measure out from the shore by a measuring line. As this stretched very much, (4 or 5 feet in 200,) it was found best to wet it first and then measure it at a certain tension. It would have been better to gauge this tension, by requiring one end of the line to raise a certain weight at the moment of measuring it, and then also at the moment of sounding. By not attending to this, I cannot place as much reliance on the *intermediate* soundings, as I otherwise might. Even with this precaution, it will be found necessary to measure the line frequently while sounding, and to see that it does not vary.

We could drive from fifteen to twenty-five stakes in a day, in measuring the rectangle and its prolongations. On ascending ground, fifteen was a good day's work, and the most that we drove in one day, on level ground, was twenty-six.

We could obtain the guide stakes on about ten *double* ranges (backward and forward, or without and within the rectangle) in a day; much time being occupied in removing and establishing the theodolite.

Having the guide stakes, we could drive from thirty to fifty angular stakes in a day, according to the figure of the ground, and as the rows were long or short.

We could *re-measure* from twenty to forty stakes on the rectangle, and the most favorable case was where the stakes were on the same level, or else in measuring down a gentle declivity, less than 6 feet in 25.

I could take from fifty to one hundred and eighty levels in a day; the greatest number on level ground, and when the air was still; the least number under contrary circumstances.

We could take from one hundred to two hundred soundings in a day, according to the strength of tide and length of the lines to be sounded on.

The proportion of good days for work during our survey, were as follows:—Calm and dry, 19; windy and dry,* 38; calm but wet, (rain or snow,) 4; stormy, 11; foggy, 3. Sundays omitted.

The 25 feet measures are made of a horizontal board 1″ thick, about 7″ wide in the middle, and 3″ wide at the end. Along the top of this a groove is cut, into which fits a vertical piece of the same dimensions, but having its under edge straight. The ends are secured together by iron bills, the extreme ends or abutting surfaces of which are about $\frac{5}{8}$″ square.

The 10 feet measures are made of one piece of wood, but sawed asunder, and the upper piece turned over, then secured together, to prevent any natural tendency to warp. The measures are graduated on only two sides, and the intermediate edge is prolonged straight to the ends, while the other edges are levelled on the iron bills.

Two levelling rods, one 10 feet, the other 20 feet long, are sufficient for most purposes. They are graduated from the feet upwards, into feet and tenths in long lines, with the hundredths in short horizontal lines, and the ends of the long lines are made largest, to be seen at a distance. The graduation is on only one side. The foot is shod with iron.

The plumb screen is made of two boards each 6′ long and 1′ wide, one edge of each fitted to the other at right angles, in the form of a trough.

The shelter for the nivellite consists of two vertical sides, $5\frac{1}{2}$′ high at the edge where they unite, and $6\frac{1}{2}$′ high at the open edge, forming two sides of an isosceles prism, with a triangular roof. These sides may be each $3\frac{1}{2}$′ wide, and

* Of these, five or six days were very cold.

the open one 4′ or 4½′ wide, in which the nivellite is placed. The tripod for resting the measures upon, should be about 6′ high, 2′ wide at top, and 4½′ at bottom, two legs framed together with four or five slats; the third leg swinging to or from these on a joint at top, like a painter's easel.

The sounding line was 50′ long, of thick tape, 1″ wide, and painted with several coats. Over these the feet and tenths were painted in black lines. Besides this, a sounding rod 6′ long, would be convenient near the shore.

The signal staves were 12′ long, and might be longer, with iron spikes at bottom, and small red flags at top.

The stakes used to drive in the ground, were 2′ 6″ long and 2″ square, of oak. A few longer ones were required in soft places.

A heavy plumb, 2½″ long, 1½″ in diameter, was found to be the best, made of brass pointed with iron.

Note.—3′ 6″ expresses 3 feet 6 inches.

[From the Journal of the Franklin Institute.]

PATENTS.

Patent *for Tempering Tanners' Fleshers, and other Edge Tools;* John Glenn, Champaigne county, Ohio, April 24.

Although there are but few processes in the arts which do not admit of improvement, there are some which are so well understood, that the changes by which they are supposed to be improved, are received with some scepticism by those who are well acquainted with the subject. The hardening and tempering of steel is one of the processes to which we allude; for effecting these operations, several patents have been obtained, the greater number of which are utterly worthless, and we see no reason for removing this new attempt out of the general list.

The flesher, we are told, is to be plated out of solid cast steel, and tempered by being heated to a dark cherry red, and held in water until perfectly cold. The flesher, or any number of them, is then to be placed in a cast iron box, and covered with oil, tallow, or other grease; this is to be heated for half an hour, as hot as it will bear without blazing, and then laid out to cool.

The foregoing contains the whole process, in which there is nothing new, and which, in many cases, will not answer the intended purpose, more especially as it is to be applied to 'all other edged tools,' which require very different degrees of temper.

Were all cast steel alike, it would, of course, all harden at the same degree of heat, but this is far from being the case; and besides this, 'a dark cherry red' will be very different by day-light, and in the dark, and will vary with every degree of light admitted; the bath of grease, also, is very inferior to other modes now practised for giving a uniform heat in tempering, the fusible alloys being much more perfect. As to keeping the pieces in for half an hour, this is no more necessary than to keep them there for half a day. When brought to the proper heat, the steel will be at the same temper as it will if kept at the same degree for any length of time. The patentee has made no claim.

PATENT *for a Screw Drill Stock;* Charles Babbitt, Taunton, Bristol County, Massachusetts, April 29.

This drill stock consists of a head, or handle, which may be of ivory, into which is fitted the upper end of a cast steel arbor, or shaft, which may be a quarter of an inch or upwards in diameter, and six or seven inches long. The part which fits into the ivory head is turned small, and revolves freely in it as in a collar, being kept in its place by a pin working in a groove. The drill fits into a socket at the lower end of the shaft. Grooves are cut upon the shaft, from end to end, forming a three threaded screw, and upon this is fitted a nut of brass, or other material, which, when taken between the finger and thumb, and worked up and down, causes the shaft to revolve. This apparatus is simple, neat, and ingenious, and, we suppose, is intended principally for the use of dentists, and for other purposes where but little force is required.

SPECIFICATION *of a patent for an improvement on the Rack Wrench, patented by Henry King.* Granted to Solyman Merrick, Springfield, Hampden county, Massachusetts, April, 18, 1834.

To all whom it may concern, be it known, that I, Solyman Merrick, of Springfield, in the county of Hampden,

and state of Massachusetts, have invented an improvement in the Rack Wrench invented by Henry King, and for which letters patent of the United States were granted unto him, on the 25th of October, 1832; and I do hereby declare that the following is a full and exact description of my said improvement.

The main bar, the slide, and the spring click, may be made in the same form and manner as those in the original Rack Wrench upon which this is an improvement; but instead of cutting the notches in which the spring click is to catch, directly upon the main bar, I make a sliding rack, of such length as may be necessary to regulate the distance of the jaws from each other, which rack I place in a groove on the upper side of the bar. Upon this sliding piece I cut teeth, or notches, to receive the spring click, either at equal or at graduated distances from each other. This sliding piece, or movable rack, is to be acted on by a screw, which must cause it to traverse backward and forward to a distance equal to that of the widest tooth in the rack. What I deem one of the best modes of arranging the parts so as to accomplish this end, is the following:—

I make the shank of the bar, or that part of it which passes through the handle thereof, round, and form a square shoulder at the point where the bar commences; over this round part I drive a turned collar, which bears against the square part of the bar, and there forms a flanch, which keeps one end of a nut, or ferule, in its place, which passes on to, and revolves freely against it. A groove is made through this collar, to correspond with that on the main bar, that the rear end of the sliding rack, before described, may pass through it. On this end of the rack, spiral grooves are cut, which match into the threads of a female screw cut upon the inside of the revolving nut, or ferule, just alluded to. This revolving ferule is then passed on to, and against, the aforenamed collar, being screwed round so that the threads on its inner surface may take on to spiral grooves, which form a segment of a male screw on the end of the rack. Another circular collar, of the same diameter with the former, which is equal, or nearly equal, to that of the revolving nut or ferule, is then driven over the shank, and against the nut, but not so closely as to interfere with its revolving motion. The wooden handle may then be driven on the shank, and rivetted in its place. The outer surface of the nut should be milled, that it may be the more readily turned round by the hand.

It will be seen that, by this arrangement, whenever the slide is placed to the nearest desirable point on the rack, the jaws can be readily and precisely adjusted by turning the nut.

Although I have pointed out what I deem to be the best mode of arranging the parts so as to adjust the sliding rack, I do not intend thereby to confine myself to this particular arrangement, but to vary the same in any way which is in accordance with the general principle or mode of action hereinbefore set forth, and by which a similar effect is produced; limiting myself, in my claim to improvement, to the addition of the movable or sliding rack, operated upon, and adjusted, by a screw. SOLYMAN MERRICK.

REMARKS BY THE EDITOR.—We have seen some of these wrenches, and esteem them as not only the neatest, but the best articles of the kind that have ever been manufactured for sale. There are, we are informed, a considerable number of hands employed in making them; but the demand for them is so great, that they have not yet found their way in numbers, to any great distance from the manufactory, in Springfield, Massachusetts. We have no doubt, that, in point of strength and durability, they excel, in a triplicate proportion, the imported wrenches of the same size; and they equally exceed them in point of workmanship, whilst they are afforded at but a small advance in price.

ENGLISH PATENTS.

SPECIFICATION *of a patent granted to John Milne, architect, for a machine or engine for dressing of stones used in masonry, by the assistance of a steam-engine, a wind, a horse, or a water power, whereby a great quantity of manual labor will be saved.* Sealed September 15th, 1829.

A machine for picking and dressing stones by attaching the tool to a falling lever, worked like a tilt hammer, the stone being placed upon a movable carriage below, formed the subject of a patent granted to Alexander Dallas, in April, 1824. The invention of the present patentee is for the same object; but in this instance the tools (for there are many) are attached to the periphery of a rotary drum or barrel, and the block of stone is progressively carried along upon a sliding frame under the rotary drum.

The barrel or drum is proposed to be of from eighteen to thirty-six inches in diameter, and from eighteen to forty-eight inches long. Round the periphery of this drum, the tools, whether pecks, chisels, addices, or droves, are to be placed in several series spirally, that is, winding round the periphery of the drum like a screw, so that the several tools may in succession be brought into operation one after the other, upon different points of the stone.

The stone intended to be dressed is, in its rude form, to be fastened upon the sliding carriage by cramps, and as the drum goes round, the carriage is intended to move on slowly, so that the points of the tools may strike against and chip off portions of the surface.

When the stone has passed once under the operation of the tools on the rotary drum, it is to be slidden back again upon its carriage; and the frame of the carriage with the stone being then raised a trifling distance by means of segment racks and pinions beneath, the carriage with the stone is again passed under the rotary drum, and the tools, pecking as before, chip off further portions of the irregular surface. This operation is to be repeated, and the position of the stone shifted, until the surfaces are worked down or dressed to the desired figure.

The rotary drum carrying the working tools is proposed to be driven by toothed gear connected with a steam-engine or other first mover, and the progressive motion of the carriage on which the stone is supported, may be produced by connecting it with the rotary motion of the drum, or the carriage may be moved independently by hand. If the former contrivance is adopted, it is obvious that any desired speed may be given to the carriage by changing the wheels of the gear which connect the drum and the carriage together.

It is proposed when bevels are desired to be worked upon the surface of the stone, that the rotary barrel should be shaped accordingly, and the tools adapted both in position and figure to produce such surfaces. In a similar way it is proposed that grooves may be cut in the stones, and that after pecking, the surface may be rendered smooth by the tools called droves.

The patentee does not confine himself to any particular forms, dimensions, or positions of the parts, but claims a rotary drum or barrel, carrying the dressing tools, and a carriage beneath for conducting the rough stone along, for

the purpose of bringing it under the operation of the rotary drum.

SPECIFICATION *of a patent granted to Thomas Shaw Brandreth, Barrister at Law, for a new method or methods of applying animal power to machinery.* Sealed 9th September, 1829.

The subject of this patent is one of the varieties of locomotive machinery in which a horse or other animal is placed within the vehicle for the purpose of exerting his muscular strength, by pushing with his feet against a receding floor, connected by gear to the running wheels of the carriage.

Upon this principle the power has usually been obtained by the horse or other animal walking upon an inclined plane, or upon the descending part of the periphery of a rotary drum as a treadmill; in which cases the gravity of the descending weight of the animal, principally, produced the power by which the machinery was to be actuated. In the present instance, however, the muscular exertion alone is brought into operation, the weight of the animal not being made conducive to the production of power.

The present machine, which is denominated a Cycloped, is intended to be the agent for drawing a series of loaded carriages behind it upon a railway. Four running wheels, like those usually employed for railway carriages, are affixed, two to the fore axles, and two to the hinder axles of the cycloped, the axles turning in bearings secured to the under part of the horizontal frame of the carriage. Two cylindrical barrels are also mounted upon axles supported by the frame, round which barrels an endless band, or two parallel endless chains, are passed. To this endless band or chains a series of transverse battens or rails of wood, placed close together, are attached, which being supported by a series of small rollers, mounted transversely in the side frames of the carriage, form a horizontal platform for the horse or other animal, to stand or walk upon.

The axles of the running wheels, and those of the cylindrical barrels, are connected together by toothed wheels and pinions, so that any rotary motion, being given to the barrels, will be communicated to the running wheels, and cause them to carry the cycloped forward.

On the top of the horizontal framework of the carriage, upright posts and side rails are erected, forming a sort of stall to enclose the horse, with a trough or manger in front,

that the animal may feed as it goes on. A collar is placed round the horse's neck, with traces or chains attached to the harness, which traces are hooked to staples in the side rails.

The horse being now made to pull by his collar, the traces draw from the staples in the side rails, and in making this effort to advance, the horse's feet act as levers against the rails of the movable floor or platform, which being by these means slidden back, causes that rotary movement of the drums connected to the platform, and of the toothed pinions upon their axles, which turns the axles of the running wheels, and impels the carriage forward upon the railway, drawing the train behind it.

[For the Mechanic.]

THE BAKERS' TRADE.

MESSRS. EDITORS:—Amid the general advance of science and progress of the arts, I believe no trade has remained entirely stationary so long as the bakers'; every part is conducted the same as it was by our grandfathers. There has been some improvement in the method of making crackers in New York, Philadelphia, and Baltimore, but it has reached no farther; the reason why it has not, I do not know. They have a plan of an improved oven, heated by hard coal, but there are so many objections—it is so expensive in construction, and so liable to get out of order, they would not be used, were it not that they bake the bread even, and are free from smut and ashes. Here we bake in the same ovens that were used in Europe four hundred years ago, and my intention in writing this, is to call the attention of the ingenious to the improvement of the oven, and I hope some of your readers will answer the following questions:

If an oven was made of metal, on the same plan as a refrigerator, the outside two or three inches from the inside, cannot steam be made to heat it hot enough for all purposes of baking, by passing through the cavities represented by the charcoal in the refrigerator? Would the same steam carry machinery after heating a row of ovens? What plan of oven can be heated even by hard coal? the

plan as abovementioned would not do, because the heat would be all on the top, when it is wanted most, or at least as much, at the bottom.

At the present price of wood, it cost fifty cents to get heat sufficient to bake one barrel of flour, and as our bakers use from two to twelve barrels per day, this makes, as you will perceive, quite a large item, any diminution of which cannot fail to receive the thanks of Bakers.

[For the Mechanic.]

USELESS PATENTS.

Since I brought before the readers of the Mechanic this subject, in an article recommending an 'Academy on Patents,' I have been more and more impressed with the importance of devising some means of regulating the patent system, and providing for the investment, in some officer or body of men, the discretionary power of denying letters patent to those whose applications are of such a nature as to render it improper or useless that they should be granted.

It is acknowledged, among well-experienced mechanics, that it is very difficult to know whether an invention be really new or not, on account of the multiplicity of inventions already extant. This is one difficulty for the want of obviating which, the luckless inventor may find himself thirty dollars worse off for his new inventions. Again, there are many who invent, as it would seem from authenticated records, who, whatever be their skill and talent for contriving, have not the faculty of ascertaining whether their contrivances will ever be of any practical advantage to any one. To be sober,—it is a disgrace to our citizens, that so many nonsensical machines ever find their way to the patent office. Besides the numerous list of those which, when their principles are analyzed, or when their practical utility is tested, prove of no possible use, there are not a few, which, however well adapted to the intended purpose, are no more useful to the community than a method of extracting sugar from opium would be, while it can be so much more easily obtained from the sugar cane or maple. Indeed, our mechanics and inventors appear to

have gone about the hardest ways possible to produce something new. If proof of these broad assertions is demanded, I need but refer to the rolls of the patent office, or to those periodicals which occasionally give us details of them, of which some specimens have been exhibited in this work.

It is not a little singular, what should be the motive which should induce so many to try their fortunes in the sea of invention, on whose shoals so many, even of their neighbors and acquaintances, have foundered, and where, should they even make some new and undiscovered land, the praise or renown would not be great, on account of the numerous adventurers who have been successful, not to speak of the much greater number who have narrowly escaped with the loss of ship and cargo.

But, notwithstanding the light which continues to dawn on these auspicious days, the evil seems to be growing worse. Thirty dollars, though too small a sum to deter a man with more genius than common sense in his head, to send forthwith for a patent right upon every new notion that may enter his cranium, is by far too great a sum for some hundreds of our citizens to throw away every year. In England, the price of a patent is so great, that no one will venture for it without good prospects of success;—perhaps it is too high for the good of the community, but in our country, without some additional counter-guard, it is by far too low. That invention in which the patentee may not realize one hundred dollars, at the least calculation, can hardly be worth patenting at all. If a fee of *two hundred* dollars would prevent half the worthless patents from coming to light, it would not, undoubtedly, debar those really useful, from being, as the law intends they shall be, sources of profit to the owners or inventors.

But were a kind of court to be established by law, before which the usefulness of the applicant's invention could be tried, I think the result would be still more beneficial. A jury of twelve mechanics selected at random from our workshops, would, I dare say, pronounce a sentence of condemnation on some of the 'new and useful inventions,' which have, within a year past, been duly enrolled in the register of patents. Let the applicant show and explain the use and application of his invention, while the court shall decide upon the validity of the claim, and the soundness of the principles urged by the applicant in

favor of his application. In case the applicant should be dissatisfied with the rejection of his claim, and deem the reasons given by the court for the unprofitableness or uselessness of his machine, as unsound, or frivolous, he should have a right to claim, notwithstanding, that the patent be granted for at least half the term, thus appealing to the highest court which can have jurisdiction in the case,—that of practice and actual experience, when, if the result should be favorable, the party may again appear, to claim the remainder of the legal term of right.

EUCLID MINOR.

MISCELLANY.

TO THE MASTER MECHANICS OF BOSTON.

The undersigned respectfully beg leave to call your attention to an institution designed expressly for the benefit of your apprentices, viz: the Mechanic Apprentices' Library. It was commenced by donations from the public in 1820, and conducted for some time by the Massachusetts Charitable Mechanic Association. In 1828, the Mechanic Apprentices of Boston formed an Association, to whom the parent Society entrusted the management of the Library, while they still defrayed its expenses. In 1832, the Apprentices assumed the whole responsibility, and have since that time had the sole conduction of it, and have met its annual expenses. During these intervals it has much improved;—from a small number of books it has risen to *two thousand* volumes, while other objects of interest have been yearly added. The whole now forms the most perfect Lyceum in the city, and offers the following privileges to Apprentices:

1. A Library of two thousand volumes, consisting of choice works on the Arts and Sciences, History, Biography and Miscellaneous Literature; many of the most popular publications of the present day have also been added.

2. A reading room—in which we are favored by the generosity of the city Editors and Publishers with their best newspapers and magazines.

3. A Cabinet of Natural History has been commenced, which is constantly increasing; and lastly, a course of exercises during the winter season—consisting of Lectures and Debates.

All these advantages, which in other places might cost two or three dollars per year, can here be enjoyed for only *one dollar.*

The institution is now in a state of prosperity, and free from debt and embarrassment—but it can only be kept so by the assistance and co-operation of the Apprentices of the city. The Society have taken a commodious hall, No. 43, Washington Street, (between Court Street and Cornhill, entrance through the arch,) which they have adapted to their use. You are respectfully invited to call and examine our institution, together with your apprentices, and if it shall be found worthy of their patronage, our end will be gained. The Library is open on Tuesday and Saturday evenings throughout the year, for the delivery of books—and the Lectures and Debates take place on Tuesdays.

By the rules of the institution, apprentices are required to produce a certificate from their master certifying their apprenticeship. Blank certificates can be had at Briggs' Mechanics' Exchange, Wilson's Lane, or at the Library Room on Tuesday and Saturday evenings.

All donations thankfully received.

GEORGE D. MILES, *President.*

WILLIAM PRATT, *Secretary.*

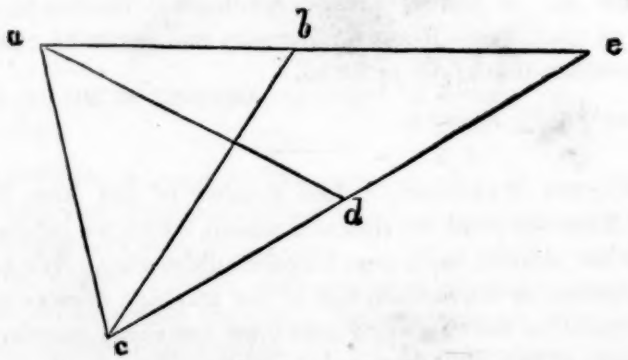
THE FLYING MACHINE.—A late number of the New York Mechanics' Magazine explains this new notion, which we briefly adverted to in our last number, with a well executed drawing. We have made no calculations on the subject, but if the machine does as well as the account reads, or the engraving looks, we are vastly mistaken. To a horizontally elliptic balloon is to be suspended a car, or boat, on board of which, in addition to the engineer, who is to direct the machine, must be placed a *steam-engine*, with *water* and *fuel*, of whatever kind, sufficient for the voyage, together with whatever other apparatus may be deemed necessary for experimenting, &c., on the voyage. We say nothing of the *machinery;* by which the balloon and boat are to be propelled,—the *silken rudder*, whose revolutions, though they *may* be *capable* of producing the intended effect, notwithstanding their apparently awkward mode of action, which it *appears* to us, would as soon turn the boat on its beams ends or bottom upward as propel it forward—still, we do not believe they ever *will* produce the effect, or have a fair opportunity of trial.

IMPROVED BAROMETER.—Mr. Durant, the æronaut, has made an important addition to the common barometer, consisting of a hollow globe of steel, affixed to the lower end of the tube, which is immersed in mercury. The object of this is to prevent the access of air into the tube, which he complains of as a great evil in the common instruments.

QUESTION.

A SURVEYOR was called upon to measure the distance from a certain house to a meeting house. It happened that there was a broad river and a deep pond directly between the two. So the surveyor measured directly northeast from the house to a tree beside the pond, half a mile; then from the tree to the bridge over the river, due north, one fifth of a mile; thence to the meeting house five-eighths of a mile, directly north-west. How far was the house from the meeting house?

ANSWER.



SOLUTION of the Question in the October number of the Mechanic. Let *e* be the inaccessible object whose distance an observer at *a* wishes to ascertain. From *a* let him measure with his line, a base, from *a* to *c*, and then measure from *c* in a direct line towards *e*, say, to *d*, perhaps, as far as he can go. Then let him measure the distance from thence to *a*, whence he set out. Then, from *a*, let him measure towards *e*, to *b*, and thence to *c*. Thus he will have the three sides of the triangles, *abc* and *acd*. Hence, he can calculate the angles *bac* in the first, and *acd* in the second triangle, which, with the base line *ac*, whose length is known, will enable him to compute the lines, *ae*, and *ce*, the distances of the inaccessible object *e*, from the two stations *a* and *e*.

If the observer be unacquainted with trigonometry, he may yet calculate the distance; but the method will require much more measuring and going over the ground, and we think it will be needless to describe it here.